

Phillip Bruce Chilson

COOPERATIVE INSTITUTE FOR RESEARCH IN THE ENVIRONMENTAL SCIENCES
UNIVERSITY OF COLORADO
and
ENVIRONMENTAL TECHNOLOGY LABORATORY
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA/ETL
325 Broadway, R/E/ET2
Boulder, Colorado 80305-3328
USA

Tel: 1-303-497-4346
Fax: 1-303-497-5318
Email: Phillip.Chilson@noaa.gov

Place of Birth: Spartanburg, SC, USA
Date of Birth: January 3, 1963
Citizenship: USA

EDUCATION

Ph.D. Physics, Clemson University, December 1993.
A Study of Precipitation Using Dual-Frequency and Interferometric Doppler Radars
M.S. Physics, University of Florida, August 1990.
The Use of Fiber Optics as an Ultra-Low Temperature Heater
B.S. Physics, Clemson University, May, 1985.

PROFESSIONAL DEVELOPMENT

Apr. 2003 – present	Adjunct Associate Professor Department of Electrical Engineering University of Nebraska, Lincoln, Nebraska
Mar. 2003 – present	Associate Editor Radio Science American Geophysical Union, Washington, DC
Apr. 2003 – present	Research Scientist III Cooperative Institute for Research in the Environmental Sciences University of Colorado, Boulder, Colorado
Aug. 2000– Apr. 2003	Research Scientist II Cooperative Institute for Research in the Environmental Sciences University of Colorado, Boulder, Colorado
Jan. 2000 – June 2000	Deputy Coordinator: Atmospheric Research Programme, Institutet för Rymdfysik, Kiruna Sweden

Dec. 1998 – June 2000	Docent (Associate Professor / Reader) in Atmospheric Physics Umeå Universitet, Umeå Sweden
Mar. 1997 – June 2000	Research Scientist Institutet för Rymdfysik, Kiruna Sweden
Feb. 1994 – Jan. 1997	Max-Planck-Gesellschaft Postdoctoral Scientist Max-Planck-Institut für Aeronomie, Katlenburg-Lindau Germany
July 1991 – Dec. 1993	Research Assistant Clemson University, Clemson, South Carolina
Mar. 1991 – June 1991	Physics Instructor Spartanburg Technical College, Spartanburg, South Carolina
June 1988 – Aug. 1990	Research Assistant University of Florida, Gainesville, Florida
Aug. 1987 – May 1988	Teaching Assistant University of Florida, Gainesville, Florida
Aug. 1986 – May 1987	Teaching Assistant Purdue University, West Lafayette, Indiana
Sept. 1985 – July 1986	Fulbright Scholar Institut für Festkörperforschung der Kernforschungsanlage, Jülich Germany

ACTIVITIES, HONORS, AND ORGANIZATIONS

Member of the European Geophysical Society
Member of the American Meteorological Society
Member of the American Geophysical Union
Member of the American Physical Society
Member of the International Meteor Organization
Member of the Sigma Pi Sigma Physics Honor Society
Member of the Alpha Lambda Delta Academic Honor Society

Recipient of a **Fulbright Scholarship - 1985**
Recipient of a **Max-Planck-Gesellschaft Postdoctoral Scientist - 1993**
Recipient of the **Clemson University Physics Award - 1993**
Recipient of the **Clemson University German Award - 1993**
Recipient of the **AGU Editor's Citation for Excellence in Refereeing - 2001**

Participant in the **NASA Earth Science Summer School – Processes of Global Change**
Participant in the **National Science Foundation Summer Science Training Program**

STUDENT SUPERVISION

Bachelor Degree Projects: University of Umeå Space Engineering Program

Annika Nilsson:, Summer 1997

Height calibration for ESRAD

Martin Johnsson:, Summer 1998

Development of a CCD Camera Control System for Use in an Unmanned Atmospheric Research Aircraft

Per Johansson:, Summer 1999

Design and construction of the telemetry link for RIPAN

Johann Stanojev:, Summer 1999

The RIPAN ground station: A virtual cockpit

Johan Carlsson:, Summer 2000

Further developments and implementation of a CCD camera for RIPAN

Ronny Härmä:, Summer 2000

Development of the upleg portion of the RIPAN Telemetry Link (RTL)

Jimmy Nyman:, Summer 2000

The digital interface for the RIPAN navigational control hardware

Doctoral Research

Victoria Barabash:, February, 2004

Investigations of Polar Mesosphere Summer Echoes in Northern Scandinavia

TEACHING EXPERIENCE

Introductory level course in mechanics and thermodynamics, Spartanburg Technical College, Spartanburg, SC, 1991.

Graduate level course in Digital Signal Processing, Swedish Institute of Space Physics, Kiruna, Sweden, 1999

Lecturer at the Third International School of Atmospheric Radar, International Centre for Theoretical Physics, Trieste, Italy, 2002.

SCIENTIFIC GRANTS AND PROPOSALS

1. P. B. Chilson, G. Schmidt, K. Schlegel, and R. Friedel, **Internal funding within the Max-Planck-Institut für Aeronomie**, DM10,000, *Investigation of lightning discharges in the upper atmosphere using VLF passive receiving stations and VHF Doppler radar*, Awarded May, 1995.
2. R. D. Palmer and P. B. Chilson, **National Science Foundation**, \$12,000, *An Investigation of the Spatial Structure and Dynamics of PMSE Using Coherent Radar Imaging*, award for a pilot study, January 1999 - June 1999.
3. P. B. Chilson **Naturvetenskapliga forskningsrådet**, SEK15,000, *Travel award for participation in a technology transfer program between IRF and NOAA towards the development of new radar interferometry methods for studying the atmosphere and atmospheric dynamics*, Awarded June 1999.

4. R. D. Palmer and P. B. Chilson, **National Science Foundation**, \$120,000, *A Study of the Small-Scale Structure of PMSE Over Sweden Using Coherent Radar Imaging*, Awarded December, 1999.
5. P. B. Chilson, **National Science Foundation**, \$121,409, *CEDAR collaborative research: Studies of radio-wave scattering and dynamical processes in the polar summer mesopause region*, Awarded February 2002.
6. P. B. Chilson, **Vaisala Inc.**, \$202,041, *Implementaion of range imaging on Vaisala wind profilers*, Awarded, June 2002.
7. P. B. Chilson, **Army Reseach Office**, \$120,637, *Probing the lower troposphere using a volume-imaging UHF radar, an S-band FMCW radar, and a X-band cloud radar: An intercomparison of observational results*, submitted.

PUBLICATIONS

Refereed Journal Articles:

1. Chaplin, R. L., and P. B. Chilson, 1986: The coefficient of kinetic friction for aluminum. *Wear*, **107**, 213–225.
2. Jung, P., and P. B. Chilson, 1987: Creep and microstructural changes in dispersion hardened Ni-20% Cr-1% Th02 during proton irradiation. *J. Nucl. Mater.*, **149**, 1–6.
3. Clark, J. C., P. B. Chilson, and G. G. Ihss, 1990: Reusable pressure seal for low temperature use requiring a small annular space. *Rev. Sci. Instrum.*, **61**, 3621–3622.
4. Chilson, P. B., J. C. Clark, and G. G. Ihss, 1991: Millikelvin heater using a light emitting diode and fibre optics. *Cryogenics*, **31**, 921–923.
5. Chilson, P. B., R. D. Palmer, M. F. Larsen, C. W. Ulbrich, S. Fukao, M. Yamamoto, T. Tsuda, and S. Kato, 1992: First observations of precipitation with a spatial interferometer. *Geophys. Res. Lett.*, **19**, 2409–2412.
6. Chilson, P. B., C. W. Ulbrich, M. F. Larsen, P. Perillat, and J. E. Keener, 1993: Observations of a tropical thunderstorm using a vertically pointing, dual frequency, collinear beam doppler radar. *J. Atmos. Ocean. Tech.*, **10**, 663–673.
7. Ulbrich, C. W., and P. B. Chilson, 1994: Effects of variations in precipitation size distribution and fallspeed law parameters on relations between mean doppler fallspeed and reflectivity factor. *J. Atmos. Ocean. Tech.*, **11**, 1656–1663.
8. Chilson, P. B., C. W. Ulbrich, M. F. Larsen, R. D. Palmer, S. Fukao, M. Yamamoto, and T. Nakamura, 1995: The effects of particle size distributions on cross-spectral phase measurements in spatial interferometry. *Radio Sci.*, **30**, 1065–1083.
9. Cohn, S. A., and P. B. Chilson, 1995: NCAR workshop on multiple-receiver and multiple-frequency techniques for wind profiling. *Bull. Amer. Meteor. Soc.*, **76**, 2474–2480.
10. Chilson, P. B., and G. Schmidt, 1996: Implementation of frequency domain interferometry at the SOUSY VHF radar: First results. *Radio Sci.*, **31**(2), 263–272.

11. Chilson, P. B., P. Czechowsky, and G. Schmidt, 1996: A comparison of ambipolar diffusion coefficients in meteor trains using VHF radar and UV lidar. *Geophys. Res. Lett.*, **23**, 2745–2748.
12. Ulbrich, C. W., and P. B. Chilson, 1996: CORRIGENDUM. *J. Atmos. Ocean. Tech.*, **13**, 915–920.
13. Chilson, P. B., A. Muschinski, and G. Schmidt, 1997b: First observations of Kelvin-Helmholtz billows in an upper level jet using VHF frequency domain interferometry. *Radio Sci.*, **32**(3), 1149–1160.
14. Chilson, P. B., P. Czechowsky, J. Klostermeyer, R. Rüster, and G. Schmidt, 1997a: An investigation of measured temperature profiles and VHF mesosphere summer echoes at midlatitudes. *J. Geophys. Res.*, **102**(D20), 23819–23828.
15. Barabash, V., P. Chilson, S. Kirkwood, A. Réchou, and K. Stebel, 1998: Investigations of the possible relationship between PMSE and tides using a VHF MST radar. *Geophys. Res. Lett.*, **35**, 3297–3300.
16. Kirkwood, S., V. Barabash, P. Chilson, A. Réchou, K. Stebel, P. Espy, G. Witt, and J. Stegman, 1998: The 1997 PMSE season - its relation to wind, temperature and water vapour. *Geophys. Res. Lett.*, **25**, 1867–1870.
17. Chilson, P. B., S. Kirkwood, and A. Nilsson, 1999: The Erange MST radar: A brief introduction and procedure for range validation using balloons. *Radio Sci.*, **34**(2), 427–436.
18. Muschinski, A., P. B. Chilson, S. Kern, J. Nielinger, G. Schmidt, and T. Prenosil, 1999: First frequency-domain interferometry observations of large-scale vertical motion in the atmosphere. *J. Atmos. Sci.*, **56**, 1248–1258.
19. Palmer, R. D., T.-Y. Yu, and P. B. Chilson, 1999: Range imaging using frequency diversity. *Radio Sci.*, **34**(6), 1485–1496.
20. Réchou, A., V. Barabash, P. Chilson, S. Kirkwood, S. Savitskaya, and K. Stebel, 1999: The influence of synoptic weather systems on vertical propagation of lee waves. *Ann. Geophys.*, **17**, 957–970.
21. Chilson, P. B., E. Belova, M. T. Rietveld, S. Kirkwood, and U.-P. Hoppe, 2000: First artificially induced modulation of PMSE using the EISCAT heating facility. *Geophys. Res. Lett.*, **27**, 3801–3804.
22. Belova, E., P. B. Chilson, M. Rapp, and S. Kirkwood, 2001: Electron temperature dependence of PMSE power: Experimental and modelling results. *Adv. Space Res.*, **28**(7), 1077–1082.
23. Chilson, P. B., S. Kirkwood, and I. Häggström, 2001a: Frequency-domain interferometry mode observations of PMSE using the EISCAT VHF radar. *Ann. Geophys.*, **18**, 1599–1612.
24. Chilson, P. B., R. D. Palmer, A. Muschinski, D. A. Hooper, G. Schmidt, and H. Steinhagen, 2001b: SOMARE-99: A demonstrational field campaign for ultra-high resolution VHF atmospheric profiling using frequency diversity. *Radio Sci.*, **36**(4), 695–707.
25. Muschinski, A., P. B. Chilson, R. D. Palmer, G. Schmidt, and H. Steinhagen, 2001: Boundary-layer convection and diurnal variation of vertical-velocity characteristics in the free troposphere. *Q. J. R. Meteorol. Soc.*, **127**, 423–444.

26. Palmer, R. D., P. B. Chilson, A. Muschinski, G. Schmidt, T.-Y. Yu, and H. Steinhagen, 2001: SOMARE-99: Observations of tropospheric scattering layers using multiple-frequency range imaging. *Radio Sci.*, **36**(4), 681–693.
27. Yu, T.-Y., R. D. Palmer, and P. B. Chilson, 2001: An investigation of scattering mechanisms and dynamics in PMSE using coherent radar imaging. *J. Atmos. Sol. Terr. Phys.*, **63**, 1797–1810.
28. Barabash, V., S. Kirkwood, and P. B. Chilson, 2002: Are variations in PMSE intensity affected by energetic particle precipitation? *Ann. Geophys.*, **20**, 539–545.
29. Chilson, P. B., T.-Y. Yu, R. D. Palmer, and S. Kirkwood, 2002: Estimates of aspect sensitivity within polar mesosphere summer echoes using coherent radar imaging. *Ann. Geophys.*, **20**, 213–223.
30. Kirkwood, S., V. Barabash, E. Belova, H. Nilsson, N. Rao, K. Stebel, A. Osepian, and P. B. Chilson, 2002: Polar mesosphere winter echoes during solar proton events. *Adv. Polar Upper Atm. Res.*, **16**, 111–125.
31. Belova, E., P. B. Chilson, S. Kirkwood, and M. T. Rietveld, 2003a: The response time of PMSE to ionospheric heating. *J. Geophys. Res.*, **108**(D8), doi:10.1029/2002JD002385.
32. Belova, E., S. Kirkwood, P. B. Chilson, and M. T. Rietveld, 2003b: Reply to comment by M. Rapp and F.-J. Lübken on “the response of time on PMSE to ionospheric heating”. *J. Geophys. Res.*, **108**(D23), doi:10.1029/2003JD004167.
33. Chilson, P. B., T.-Y. Yu, R. G. Strauch, A. Muschinski, and R. D. Palmer, 2003: Implementation and validation of range imaging on a UHF radar wind profiler. *J. Atmos. Ocean. Tech.*, **20**(7), 987–996.
34. Chilson, P. B., 2004: The retrieval and validation of Doppler velocity estimates from range imaging. *J. Atmos. Ocean. Tech.*, **21**(7), 1033–1043.
35. Fernandez, J. R., R. D. Palmer, and P. B. Chilson, 2004: Range imaging observations of PMSE using the EISCAT VHF radar: Phase calibration issues and first results. *Ann. Geophys.*, **in press**.
36. Muschinski, A., P. B. Chilson, T.-Y. Yu, R. G. Strauch, and R. D. Palmer, 2003: Observations of finescale structure and dynamics of the interface capping a continental stratus cloud. *J. Appl. Meteorol.*, **in preparation**.

Conference Proceedings:

1. Kilian, J. D., P. B. Chilson, G. G. Ihias, and E. D. Adams, 1989: New design for a copper demagnetization stage, AIP Conference Proceedings 194, *Quantum Fluids and Solids - 1989*, Eds. G. G. Ihias and Y. Takano, 393–396.
2. Chilson, P. B., R. D. Palmer, M. F. Larsen, C. W. Ulbrich, S. Fukao, M. Yamamoto, T. Nakamura, and S. Kato, 1993: Precipitation measurements using spatial interferometry, Proceedings of the *26th International Conference on Radar Meteorology*, AMS, 648–651.
3. Keener, J. E., C. W. Ulbrich, M. F. Larsen, R. D. Palmer, and P. B. Chilson, 1993: A study of tropical thunderstorm lightning with the use of dual wavelength Doppler radar, Proceedings of the *26th International Conference on Radar Meteorology*, AMS, 324–326.

4. Ulbrich, C. W., P. B. Chilson, M. F. Larsen, and J. E. Keener, 1993: Z - V measurements obtained using dual frequency Doppler measurements at vertical incidence, *Proceedings of the 26th International Conference on Radar Meteorology*, AMS, 641–643.
5. Chilson, P. B. and C. W. Ulbrich, 1994: The dependence of v_D - Z relations on variations in precipitation size distribution and fall speed law parameters, *Proceedings of the International Seminar on Advanced Weather Radar Systems*, COST-75, Ed. C.G. Collier, 419–427.
6. Chilson, P. B., E. L. Sheppard, M. F. Larsen, R. D. Palmer, C. W. Ulbrich, S. Fukao, M. Yamamoto, T. Nakamura, and T. Tsuda: 1994, Analysis of real and simulated precipitation data using spatial interferometry techniques, *Proceedings of the Sixth Workshop on Technical and Scientific Aspects of MST/ST*, STEP Handbook, Ed. B. Edwards, 277–281.
7. Chilson, P. B., C. W. Ulbrich, M. F. Larsen, S. Fukao, M. Yamamoto, T. Nakamura, and T. Tsuda: 1994, Temporal decorrelations of spatial interferometry measurements resulting from precipitation particle size distributions, *Proceedings of the Third International Symposium on Tropospheric Profiling: Needs and Technology*, 283–285.
8. Chilson, P. B., P. Czechowsky, J. Klostermeyer, R. Rüster, and G. Schmidt, 1996: A study of PMSE-like echoes at mid latitudes using VHF radar and lidar, *Proceedings of the Seventh Workshop on Technical and Scientific Aspects of MST/ST Radar*, STEP Handbook, Ed. B. Edwards, 88–91.
9. Chilson, P. B., P. Czechowsky, and G. Schmidt, 1996: VHF aspect sensitivity measurements using frequency domain interferometry, *Proceedings of the Seventh Workshop on Technical and Scientific Aspects of MST/ST Radar*, STEP Handbook, Ed. B. Edwards, 18.
10. Chilson, P. B., P. Czechowsky, and G. Schmidt, 1996: A comparison of ambipolar diffusion coefficients near the mesopause as determined by VHF radar and UV lidar observations, *Proceedings of the Seventh Workshop on Technical and Scientific Aspects of MST/ST Radar*, STEP Handbook, Ed. B. Edwards, 286–289.
11. Chilson, P. B., A. Muschinski, and G. Schmidt, 1996: Simultaneous observations of a jet stream passage using FDI and a microbarometer, *Proceedings of the Seventh Workshop on Technical and Scientific Aspects of MST/ST Radar*, STEP Handbook, Ed. B. Edwards, 113–116.
12. Koschny, D., P. B. Chilson, and G. Schmidt, 1996: A setup for parallel observations between an intensified meteor camera and a backscatter radar, *Proceedings of the International Meteor Conference*, Eds. A. Knöfel, P. Roggemans, 115–121.
13. Muschinski, A., P. B. Chilson, G. Schmidt, and R. Hollmann, 1996: FDI measurements with the SOUSY VHF radar: A comparison between the time series of layer altitudes and Doppler shifts, *Proceedings of the Seventh Workshop on Technical and Scientific Aspects of MST/ST Radar*, STEP Handbook, Ed. B. Edwards, 407–410.
14. Barabash, V., P. B. Chilson, S. Kirkwood, A. Réchou, and K. Stebel, 1997: MST radar observations of lee waves in the Kiruna area: A complement to optical measurements of polar stratospheric clouds, *Proceedings of the 24th Annual European Meeting on Atmospheric Studies by Optical Methods*, 154–154.
15. Chilson, P. B., D. Koschny, A. Knöfel, and G. Schmidt, 1997: A comparative investigation of meteor trains near the Earth's mesopause using radar and video observations, *Proceedings of the 24th Annual European Meeting on Atmospheric Studies by Optical Methods*, 67–72.

16. Chilson, P. B., A. Muschinski, and G. Schmidt, 1997: An investigation of Kelvin-Helmholtz billows in an upper-level jet stream using VHF frequency domain interferometry, Proceedings of the *COST-76 Profiler Workshop*, 278–281.
17. Kirkwood, S., A. Réchou, K. Stebel, V. Barabash, P. Chilson, L. Marcus, and P.-E. Olsen, 1997: Wind profiling with ESRAD, the Esrange MST radar, Proceedings of the *COST-76 Profiler Workshop*, 70–73.
18. Knöfel, A., D. Koschny, P. B. Chilson, and G. Schmidt, 1997: Meteor observations with radar and video - the SIV experiment, *Proceedings of the International Meteor Conference 1997*, 55–64.
19. Petitdidier, M., P. B. Chilson, C. W. Ulbrich, 1997: Observations of gravity waves and turbulence associated with a tropical thunderstorm, Proceedings of the *1st SPARC General Assembly*, WCRP-99, WMO/TD-NO.814, 401-404.
20. Stebel, K., P. Chilson, V. Barabash, S. Kirkwood, A. Réchou, P. Hoffmann, W. Singer, and G. Schmidt, 1997: MST-radar lee wave observations during winter 1996/97 in Northern Scandinavia, Proceedings of the *13th ESA Symposium on Rocket and Balloon Programmes and Related Research*, 179–183.
21. Barabash, V., P. B. Chilson, S. Kirkwood, A. Réchou, and K. Stebel, 1998: MST radar observations of PMSE in Northern Scandinavia during May-August 1997, Proceedings of the *8th International Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 330–333.
22. Chilson, P. B., S. Kirkwood, and A. Nilsson, 1998: Height calibration of ESRAD using balloons and a tracking radar, Proceedings of the *Eighth Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 306–309.
23. Chilson, P. B., S. Kirkwood, L. Poromaa, and L. Marcus, 1998: An introduction to ESRAD: A new VHF MST radar located at Esrange in Northern Sweden, Proceedings of the *Eighth Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 302–305.
24. Chilson, P. B., D. Koschny, A. Knöfel, and G. Schmidt, 1998: Observations of the 1996 Geminid meteor shower: A comparison of VHF radar and video observations, Proceedings of the *Eighth Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 326–329.
25. Petitdidier, M., K. Ramage, P. B. Chilson, and C. W. Ulbrich, 1998: Wave and turbulence activity above a tropical thunderstorm, Proceedings of the *Eighth Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 224–226.
26. Persson, K., H. Nilsson, S. Kirkwood, A. Réchou, and P. Chilson, 1998: Time sections of frontal passages seen in the MST radar signal compared with ozone data, *Proceedings of the 4th European Symposium on Stratospheric Ozone*, Air Pollution Research Report 66, European Commission, 66–69.
27. Réchou, A., V. Barabash, P. Chilson, S. Kirkwood, T. Savitskaja, and K. Stebel, 1998: ESRAD MST radar analysis of the waves, *Proceedings of the 4th European Symposium on Stratospheric Ozone*, Air Pollution Research Report 66, European Commission, 70–73.

28. Chilson, P. B., P. Johansson, M. Johnsson, R. Moses, J. Stanojev, T. Hedquist, A. Niva, R. Scheifele, 1999: RIPAN: A remotely controlled aircraft project for troposphere/stratosphere research, Proceedings of the *14th ESA Symposium on European Rocket and Balloon Programmes and Related Research*, 111–116.
29. Stebel, K., S. Kirkwood, V. Barabash, P. B. Chilson, and A. Réchou, 1999: Leewave observations by the MST radar ESRAD in northern Sweden, Proceedings of the *European Workshop on Mesoscale Processes in the Stratosphere*, 233–238.
30. Barabash, V., P. Chilson, and S. Kirkwood, 2000: A comparison of PMSE occurrence with energetic particle precipitation detected by riometer in Northern Scandinavia, Proceedings of the *Ninth International Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 108–111.
31. Chilson, P. B., E. Belova, M. Rietveld, S. Kirkwood, and U.-P. Hoppe, 2000: First artificially induced modulation of PMSE using the EISCAT heating facility, Proceedings of the *Ninth International Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 104–107.
32. Chilson, P. B., R. D. Palmer, A. Muschinski, D. A. Hooper, G. Schmidt, and H. Steinhagen, 2000: SOMARE-99: A demonstrational field campaign for ultra-high resolution VHF atmospheric profiling using frequency diversity, Proceedings of the *Ninth International Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 39–42.
33. Latteck, R., R. Rüster, W. Singer, J. Röttger, P. B. Chilson, and V. Barabash, 2000: Comparison of polar mesosphere summer echoes observed with the ALWIN MST radar at 69°N, the SOUSY-Svalbard-radar at 78°N, and the ESRAD radar at 68°N in Summer 1999, Proceedings of the *Ninth International Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 100–103.
34. Palmer, R. D., P. B. Chilson, A. Muschinski, G. Schmidt, T.-Y. Yu, and H. Steinhagen, 2000: Range imaging using frequency diversity: Theory and application, Proceedings of the *Ninth International Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 43–46.
35. Yu, T.-Y., R. D. Palmer, and P. B. Chilson, 2000: Observations of polar summer mesosphere echoes using coherent radar imaging, Proceedings of the *Ninth International Workshop on Technical and Scientific Aspects of MST Radar*, STEP Handbook, Ed. B. Edwards, 125–128.
36. S. Kirkwood, V. Barabash, E. Belova, H. Nilsson, T. N. Rao, K. Stebel, U. Blum, K.-H. Fricke, A. Osepian, and Phillip B. Chilson, 2002: Polar Mesosphere Winter Echoes - by ESRAD, EISCAT and lidar, memoirs of the British Astronomical Society, vol 45, paper 07, September 2002

PRESENTATIONS

Dr. Chilson has been lead author or contributing author on over 60 invited and contributed presentations in 16 countries.